

**PATENT**  
**03370-P0069A WWW**

**UNITED STATES PATENT APPLICATION**

of

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for

**SLEEVE FOR A DISC BRAKE**

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**SLEEVE FOR A DISC BRAKE**

[0001] This application is a continuation of pending International Patent Application No. PCT/SE02/01294 filed July 1, 2002 which designates the United States and claims priority of pending Swedish Application No. 0102350-0 filed July 1, 2001.

**Field of Invention**

[0002] The present invention concerns a sleeve for use at a disc brake. The invention is developed for use with brakes for trucks, lorries, busses, trailers or the like, but a person skilled in the art realises that it may be used for any kind of vehicle.

**Background of Invention**

[0003] The present invention is intended for use with disc brakes having a fixed caliper. In disc brakes having a fixed caliper one or more brake discs are normally arranged rotatably fixed but axially slideable in relation to the wheel axle. The brake disc is connected to the wheel axle by means of intermediary parts. The intermediary parts are also connected to the wheel flange. In the prior art the number of intermediary parts is often rather high. In view of reducing the complexity and the size of the brake there is a need for a reduced number of intermediary parts. The present invention is directed to said intermediary parts between the brake disc and the wheel axle.

[0004] Regarding maintenance one object is that it should be as few steps as possible to replace a brake disc. In the prior art the intermediary parts often comprise a flange disc or a part partly formed as a disc to be attached to the actual wheel flange. If the brake disc is to be replaced the flange disc or the part formed as a disc has to be removed before the disc

could be replaced. Thus, one has to go through several steps when replacing a disc brake according to the prior art.

[0005] A further problem is that the heat produced during breaking may be quite substantial. Thus, there is a need for means at the intermediary parts, to protect different parts of the brake and axle against overheating.

### Summary of Invention

[0006] One object of the present invention is to arrange the intermediary parts in such a way that a cooling effect is created. The cooling effect is mainly to protect bearing means being part of the intermediary parts. It may also be necessary to protect other parts, such as sensors against overheating.

[0007] The above object is met by a sleeve for a disc brake, which sleeve has means for co-operation with at least one brake disc. The sleeve is to be received on a wheel axle. Furthermore, the sleeve has a groove, the main orientation of which being parallel with the outer periphery of the sleeve.

[0008] A further object of the present invention is to facilitate maintenance of the disc brakes and especially to facilitate replacement of the brake disc.

[0009] Still a further object of the present invention is to reduce the number of parts used for connecting, directly or indirectly, a brake disc to a wheel axle and wheel flange, respectively.

[00010] The integrated sleeve and hub of the present invention reduce the number of intermediary parts between the wheel axle and the wheel flange from four to two.

[00011] Further objects and advantages of the present invention will be obvious for a person skilled in the art when reading the detailed description below of a preferred embodiment.

#### Brief Description of Drawings

[00012] The present invention will be described more closely below with reference to a preferred embodiment, by way of an example, and with further reference to the enclosed drawings. In the drawings,

[00013] Fig. 1 is a perspective view, partly in section of a sleeve according to the present invention fixed to a wheel flange,

[00014] Fig. 2 is a perspective view of the sleeve of Fig. 1, and

[00015] Fig. 3 is a perspective view, partly in section, of the sleeve of Figs. 1 and 2 taken from the opposite direction.

#### Detailed Description of a Preferred Embodiment

[00016] The integrated sleeve 2 of the present invention corresponds to a sleeve and hub, normally present at disc brakes of the prior art.

[00017] According to the present invention the integrated sleeve 2 is attached directly to a wheel flange 1. Thus, the wheel flange 1 has to be made strong and stiff enough to carry the sleeve 2 of the disc brake. In the shown embodiment the sleeve 2 is attached to the wheel flange 1 by means of a number of bolts 3. In the shown embodiment there are twelve bolts 3, but a person skilled in the art realises that the number of bolts may be different in other embodiments. The bolts 3 are received in threaded openings of the sleeve 2. The threaded openings of the sleeve 2 are arranged on the end of the sleeve 2 intended for contact with the wheel flange 1. The threaded

openings of the sleeve 2 are adapted to corresponding openings in the wheel flange 1.

[00018] The integrated sleeve 2 is to be placed on the wheel axle. The inner periphery of the sleeve 2 is received on the wheel axle by way of a bearing means (not shown).

[00019] The sleeve 2 is to support one or more brake discs (not shown) by way of means for co-operation with corresponding means of the brake disc(s). In the shown embodiment the means for co-operation with the brake disc(s) is splines. The splines have the form of raised portions 4 and grooves 5 arranged on the outer periphery of the sleeve 2. The actual cross-sectional form of the splines may vary between different embodiments. The splines of the sleeve 2 are to co-operate with corresponding parts of the brake disc(s). The brake disc(s) is received rotatably fixed to the sleeve 2 but moveable in an axial direction.

[00020] The outer periphery of the raised portions 4 and grooves 5, forming the splines of the sleeve 2, is straight and parallel with the main extent of the wheel axle. Expressed differently the sleeve 2 has a generally tubular form. The outer form of the sleeve 2 permits a brake disc to be slid off or onto the sleeve 2 in any axial direction.

[00021] A groove 6 is arranged in the sleeve 2, which groove is open towards one end of the sleeve 2. The groove 6 is parallel with the outer periphery of the sleeve 2 and is open in the direction away from the wheel flange 1. Thus, the groove 6 does not extend all the way to the end of the sleeve 2 to be attached to the wheel flange 1. By the groove 6 an inner wall 7 is formed at the inner periphery of the sleeve 2. The inner wall 7 has a shorter axial extension directed away from the wheel flange 1 than the outer wall of the sleeve 2.

[00022] At the open end of the groove 6, i.e. the end directed away from the wheel flange 1, a number of bridges 8 connect the inner wall 7 to the outer wall of the sleeve 2. The bridges 8 have a stiffening effect. The purpose of the groove 6 is to protect the bearing means placed between the inner wall 7 of the sleeve and the wheel axle against overheating. It is especially the grease of the bearing means that is in the risk of being overheated.

[00023] By the form and placement of the integrated sleeve 2 it is fairly simple to replace the brake disc. To replace the brake disc the bolts 3 are first unscrewed and the wheel with the wheel flange 1 is lifted off. When the wheel has been lifted off the brake disc(s) may be slid on the splines 4, 5 of the sleeve 2 out off the sleeve 2. Then a new brake disc may be slid back onto the splines 4, 5 of the sleeve 2 and the wheel flange 1 is then fixed to the sleeve 2.